This document gives pertinent information concerning the reissuance of the VPDES Permit listed below. This permit is being processed as a Major, Municipal permit. The discharge results from the operation of an 11 MGD wastewater treatment plant with a future expanded flow tier of 22 MGD. This permit action consists of updating the proposed effluent limits to reflect the current Virginia WQS (effective January 6, 2011), updating permit language as appropriate, and adding five (5) outfalls for flushing the reclaimed water lines. The permit also contains reclamation and reuse authorization. The effluent limitations and special conditions contained in this permit will maintain the Virginia Water Quality Standards of 9VAC25-260 et seq.

1.	Facility Name and Mailing Address:	Broad Run Water Reclamation Facility PO Box 4000 Leesburg, VA 20146	SIC Code :	4952 WWTP
	Facility Location:	44961 Loudoun Water Way Ashburn, VA 20146	County:	Loudoun
	Facility Contact/Title:	Sarah Lothman Senior Process Engineer	Telephone Number:	(571)291-7990
	Facility E-mail Address:	SLothman@loudounwater.org		
2.	Permit No.:	VA0091383	Expiration Date of previous permit:	August 24, 2015
	Other VPDES Permits associated with this facility:		VAN010017	
	Other Permits associated with this facility:		Air Registration #73268	
	E2/E3/E4 Status:	Not Applicable (NA)		
3.	Owner Name/Title:	Loudoun County Sanitation Authority d/b/a Loudoun Water		
	Owner Contact:	Michael Rumke Superintendent BRWRF	Telephone Number:	(571)291-7826
	Owner E-mail Address:	MRumke@loudounwater.org		
4.	Application Complete Date:	February 20, 2015 with supplemental application information submitted November 19, 2015		
	Permit Drafted By:	Alison Thompson	Date Drafted:	3/21/16
	Draft Permit Reviewed By:	Doug Frasier	Date Reviewed:	3/25/16
	WPM Review By:	Bryant Thomas	Date Reviewed:	4/21/16
	Public Comment Period :	Start Date:	End Date:	

5. Receiving Waters Information: See Attachment 1 for the Flow Frequency Determination

Outfall 001

Receiving Stream Name:	Broad Run	Stream Code:	BRB
Drainage Area at Outfall:	60 sq.miles	River Mile:	4.50
Stream Basin:	Potomac	Subbasin:	Potomac
Section:	8	Stream Class:	III
Special Standards:	PWS	Waterbody ID:	VAN-A09R/PL19
7Q10 Low Flow:	0.27 MGD	7Q10 High Flow (Dec-May):	3.03 MGD
1Q10 Low Flow:	0.23 MGD	1Q10 High Flow (Dec-May):	2.12 MGD
30Q10 Low Flow:	0.65 MGD	30Q10 High Flow (Dec-May):	5.19 MGD
Harmonic Mean Flow:	4.76 MGD	30Q5 Flow:	1.21 MGD

Outfall 002

Receiving Stream Name:	Broad Run, UT to UT	Stream Code:	XOE
Drainage Area at Outfall:	<1 sq mile	River Mile:	0.05
Stream Basin:	Potomac	Subbasin:	Potomac
Section:	8	Stream Class:	III
Special Standards:	PWS	Waterbody ID:	VAN-A09R/PL19
7Q10 Low Flow:	0.0 MGD	7Q10 High Flow (Dec-May):	0.0 MGD
1Q10 Low Flow:	0.0 MGD	1Q10 High Flow (Dec-May):	0.0 MGD
30Q10 Low Flow:	0.0 MGD	30Q10 High Flow (Dec-May):	0.0 MGD
Harmonic Mean Flow:	0.0 MGD	30Q5 Flow:	0.0 MGD

Outfall 003

Receiving Stream Name:	Broad Run, UT to UT	Stream Code:	XOG
Drainage Area at Outfall:	<1 sq. mile	River Mile:	0.60
Stream Basin:	Potomac	Subbasin:	Potomac
Section:	9	Stream Class:	III
Special Standards:	None	Waterbody ID:	VAN-A09R/PL19
7Q10 Low Flow:	0.0 MGD	7Q10 High Flow (Dec-May):	0.0 MGD
1Q10 Low Flow:	0.0 MGD	1Q10 High Flow (Dec-May):	0.0 MGD
30Q10 Low Flow:	0.0 MGD	30Q10 High Flow (Dec-May):	0.0 MGD
Harmonic Mean Flow:	0.0 MGD	30Q5 Flow:	0.0 MGD

Outfall 004

Receiving Stream Name:	Broad Run, UT to UT	Stream Code:	XOG
Drainage Area at Outfall:	<1 sq. mile	River Mile:	0.22
Stream Basin:	Potomac	Subbasin:	Potomac
Section:	9	Stream Class:	III
Special Standards:	None	Waterbody ID:	VAN-A09R/PL19
7Q10 Low Flow:	0.0 MGD	7Q10 High Flow (Dec-May):	0.0 MGD
1Q10 Low Flow:	0.0 MGD	1Q10 High Flow (Dec-May):	0.0 MGD
30Q10 Low Flow:	0.0 MGD	30Q10 High Flow (Dec-May):	0.0 MGD
Harmonic Mean Flow:	0.0 MGD	30Q5 Flow:	0.0 MGD

Outfall 005

Receiving Stream Name:	Broad Run, UT to UT	Stream Code:	XOI
Drainage Area at Outfall:	<1 sq. mile	River Mile:	0.13
Stream Basin:	Potomac	Subbasin:	Potomac
Section:	9	Stream Class:	III
Special Standards:	None	Waterbody ID:	VAN-A09R/PL19
7Q10 Low Flow:	0.0 MGD	7Q10 High Flow (Dec-May):	0.0 MGD
1Q10 Low Flow:	0.0 MGD	1Q10 High Flow (Dec-May):	0.0 MGD
30Q10 Low Flow:	0.0 MGD	30Q10 High Flow (Dec-May):	0.0 MGD
Harmonic Mean Flow:	0.0 MGD	30Q5 Flow:	0.0 MGD

Outfall 006

Receiving Stream Name:	Broad Run, UT	Stream Code:	XOH
Drainage Area at Outfall:	<1 sq. mile	River Mile:	1.03
Stream Basin:	Potomac	Subbasin:	Potomac
Section:	9	Stream Class:	III
Special Standards:	None	Waterbody ID:	VAN-A09R/PL19
7Q10 Low Flow:	0.0 MGD	7Q10 High Flow (Dec-May):	0.0 MGD
1Q10 Low Flow:	0.0 MGD	1Q10 High Flow (Dec-May):	0.0 MGD
30Q10 Low Flow:	0.0 MGD	30Q10 High Flow (Dec-May):	0.0 MGD
Harmonic Mean Flow:	0.0 MGD	30Q5 Flow:	0.0 MGD

6. Statutory or Regulatory Basis for Special Conditions and Effluent Limitations:

- X State Water Control Law
- X Clean Water Act
- X VPDES Permit Regulation
- X EPA NPDES Regulation
- X EPA Guidelines
- X Water Quality Standards
- X Other (9VAC25-401 Sewage Treatment In the Dulles Area Watershed, 9VAC25-740 Reclamation and Reuse)

7. Licensed Operator Requirements: Class I

8. Reliability Class: Class I

9. Permit Characterization:

- ___ Private
- ___ Federal
- ___ State
- X POTW
- X TMDL
- ___ Effluent Limited
- X Water Quality Limited
- X Whole Effluent Toxicity Program Required
- X Pretreatment Program Required
- X e-DMR Participant
- X Possible Interstate Effect
- ___ Compliance Schedule Required
- ___ Interim Limits in Permit
- ___ Interim Limits in Other Document

10. Wastewater Sources and Treatment Description:

The Broad Run Water Reclamation Facility (WRF) is the first advanced wastewater treatment facility in the Dulles Area Watershed. The facility is designed to meet the stringent effluent discharge limits specified in the regulation of Sewage Treatment in the Dulles Area Watershed as contained in 9VAC25-401. The permit was first issued April 1, 2005 and was modified in 2006 when Loudoun Water had CH2MHill rerate the three flow tiers. The facility began discharging on May 2, 2008. The facility includes primary treatment (grit removal, primary clarifiers, and fine screens), membrane bioreactors for the biological treatment process, chemical addition followed by granular activated carbon (GAC) contactors and ultraviolet (UV) disinfection. The effluent is post aerated before it is discharged to Broad Run. The CTO for the 11 MGD flow was issued on May 26, 2010. See Attachment 2 for a process flow diagram and narrative.

The facility applied for a No-Exposure Certification for the Stormwater Industrial General Permit. DEQ staff performed a site inspection on November 17, 2009 and the certification was granted on November 23, 2009. A copy of the inspection and the No-Exposure letter are found in Attachment 3.

Loudoun Water first submitted an application addendum for Reclamation and Reuse in July 2009 and an Administrative Authorization for Reclamation and Reuse was signed in December 2009. The monitoring and special conditions for reclamation and reuse were incorporated into the VPDES permit with the August 2010 reissuance. More specific details on the reclamation and reuse monitoring and special conditions is found in Fact Sheet Section 24 and Attachment 17.

With this reissuance Loudoun Water has applied for coverage for five outfalls that will discharge reclaimed water from the reclaimed water distribution system when maintenance activities (i.e. flushing) are necessary to maintain the quality of the reclaimed water. It is estimated that these outfalls will only discharge twice a year.

TABLE 1 – Outfall Description

Outfall Number	Discharge Sources	Treatment	Design Flow(s)	Outfall Latitude and Longitude
001	Domestic and/or Commercial Wastewater	See Item 10 above.	11 MGD with future expansion to 22 MGD	39°01'50" 77°26'39"
002	Reclaimed Water	Dechlorination	1000 gpm* for 45 minutes	39°02'36" 77°25'43"
003	Reclaimed Water	Dechlorination	540 gpm for 15 minutes	39°01'27" 77°27'15"
004	Reclaimed Water	Dechlorination	550 gpm for 15 minutes	39°01'15" 77°27'10"
005	Reclaimed Water	Dechlorination	1820 gpm for 20 minutes	39°00'57" 77°27'27"
006	Reclaimed Water	Dechlorination	1400 gpm for 25 minutes	39°01'08" 77°27'34"
See Attachment 4 for (Sterling Quadrangle, DEQ #214C) topographic map.				

*gpm = gallons per minute as per Form 2D

11. Sludge Treatment and Disposal Methods:

The Broad Run WRF uses gravity thickening, mesophilic anaerobic digestion, and centrifugation to treat the sludge generated by the wastewater treatment processes. The facility produces Class B sewage sludge at a rate of approximately 3650 dry metric tons per 365-day period.

The dewatered cake is stored and land applied by Synagro Central LLC (VPA00813).

The dewatered cake can also be hauled to the King George County Landfill for final disposal.

12. Discharges, Intakes, Monitoring Stations, Other Items in Vicinity of Discharge

TABLE 2 – Other Items	
VA0089541	MWAA - Washington Dulles International Airport
1aBRB002.15	DEQ's Ambient Water Quality Monitoring Station located on Broad Run at the Route 7 Bridge.
VAG836053	Herndon Service Center (VPDES General Permit) discharge to Broad Run.
0.62 miles from outfall	A feeder line to the Potomac Interceptor crosses Broad Run creating a four foot dam.
4.5 miles from outfall	Broad Run confluence with the Potomac River.
10.2 miles from outfall	The Fairfax Water's Potomac River Intake.

13. Material Storage:

A summary of materials stored onsite is found in Attachment 5.

14. Site Inspection:

Performed by DEQ-Water Compliance staff on February 25, 2015 (Attachment 6). Inspection of the new outfalls for the reclaimed wastewater distribution system was completed by Alison Thompson on October 6, 2015 (Attachment 7).

15. Receiving Stream Water Quality and Water Quality Standards:

a. Ambient Water Quality Data

Outfall 001 discharges to a segment of Broad Run (streamcode BRB) that was assessed based on biological monitoring stations located in downstream and upstream segments of Broad Run: 1aBRB002.15 is located at Route 7, approximately 2.35 miles downstream from Outfall 001, within a segment that begins approximately 1.6 miles downstream from Outfall 001 and 1aBRB006.97 is located upstream from Route 625, approximately 2.47 miles upstream from Outfall 001, within a segment that begins approximately 0.71 mile upstream from Outfall 001.

The following is the water quality summary for this segment of Broad Run, as taken from the draft 2014 Integrated Report:

Class III, Section 8, special stds. PWS.

DEQ monitoring stations for this segment of Broad Run:
-biological monitoring station 1aBRB002.15, at Route 7
-biological monitoring station 1aBRB006.97, upstream from Route 625
The fish consumption use is categorized as impaired due to a Virginia Department of Health, Division of Health Hazards Control, PCB fish consumption advisory. Biological monitoring finds a benthic macroinvertebrate impairment, resulting in an impaired classification for the aquatic life use. The public water supply, recreation, and wildlife uses were not assessed.

The nearest DEQ ambient monitoring station is located within the segment of Broad Run that is located approximately 0.71 mile upstream from Outfall 001: 1aBRB006.33 is located at Route 625, approximately 1.83 miles upstream from Outfall 001. The following is the water quality summary for this segment of Broad Run, as taken from the draft 2014 Integrated Report:

Class III, Section 9.

DEQ monitoring stations located in this segment of the Broad Run:
-ambient water quality monitoring station 1aBRB006.33, at Route 625 (Waxpool Road)
-biological monitoring station 1aBRB006.97, upstream from Waxpool Road

The fish consumption use is categorized as impaired due to a Virginia Department of Health, Division of Health Hazards Control, PCB fish consumption advisory. Biological monitoring finds a benthic macroinvertebrate impairment, resulting in an impaired classification for the aquatic life use. E. coli monitoring finds a bacterial impairment, resulting in an impaired classification for the recreation use. The wildlife use is considered fully supporting.

Outfall 002 discharges to an unnamed tributary (streamcode XOE) that has been neither monitored nor assessed. This unnamed tributary drains to another unnamed tributary (streamcode XOD) that drains to Broad Run (BRB). DEQ ambient monitoring station 1aBRB002.15 is located on Broad Run at Route 7, approximately 0.4 mile downstream from Outfall 002.

The following is the water quality summary for this segment of Broad Run, as taken from the draft 2014 Integrated Report:

Class III, Section 8, special stds. PWS.

DEQ monitoring stations located in this segment of Broad Run:
-ambient and biological 1aBRB002.15, at Route 7

The fish consumption use is categorized as impaired due to a Virginia Department of Health, Division of Health Hazards Control, PCB fish consumption advisory and fish tissue monitoring. Additionally, from previous assessments, excursions above the water quality criterion based fish tissue value (TV) of 300 parts per billion (ppb) for mercury (Hg) in fish tissue were recorded in 2 species of fish in 2004: smallmouth bass and yellow bullheaded catfish and there was one excursion above the water quality criterion based fish tissue value (TV) of 20 parts per billion (ppb) for total PCBs in fish tissue were recorded in 1 species of fish in 2004: American eel. There was an excursion above the risk-based tissue screening value (TSV) of 72 ppb for arsenic (As) in 2004 (American eel). This excursion is also above the updated (in 2010) TSV of 270 ppb for arsenic. Also, there was an excursion above the water quality criterion based tissue value (TV) of 12 ppb for heptachlor epoxide in 2001 (American eel) at monitoring station 1aBRB002.15 (the TV for heptachlor epoxide was been updated to 4.4 ppb in 2010). The arsenic and heptachlor epoxide exceedances were noted as observed effects for the fish consumption use.

DEQ biological monitoring finds a benthic macroinvertebrate impairment, resulting in an impaired classification for the aquatic life use. Additionally, citizen monitoring indicates a high probability of adverse conditions for biota. Chemical monitoring at the USGS station finds one exceedance of the chloride acute freshwater criterion in 2007. An observed effect is noted for the aquatic life and wildlife uses. The wildlife use is otherwise considered fully supporting.

E. coli monitoring finds a bacterial impairment, resulting in an impaired classification for the recreation use. The public water supply use is considered fully supporting.

Outfalls 003 and 004 discharge to an unnamed tributary (streamcode XOG) that has been neither monitored nor assessed. This unnamed tributary drains to another unnamed tributary (streamcode XOF) that drains to Broad Run (BRB). Outfall 006 drains to unnamed tributary XOH, which has been neither monitored nor assessed and drains to Broad Run (streamcode BRB). Outfall 005 drains to an unnamed tributary (streamcode XOI) that has been neither monitored nor assessed and that drains to unnamed tributary XOH. Outfalls 003, 004, 005, and 006 all ultimately drain to the same assessed segment of Broad Run, which is located approximately 0.87 mile downstream from Outfall 003, approximately 0.49 mile downstream from Outfall 004, approximately 0.81 mile downstream from Outfall 005, and approximately 0.90 mile downstream from Outfall 006.

DEQ ambient monitoring station 1aBRB006.33 is located on Broad Run at Route 625, approximately 0.80 mile upstream from the confluence of unnamed tributary XOF with Broad Run and approximately 0.44 mile upstream from the confluence of unnamed tributary XOH with Broad Run.

The following is the water quality summary for this segment of Broad Run, as taken from the draft 2014 Integrated Report:

Class III, Section 9.

DEQ monitoring stations located in this segment of Broad Run:
-ambient water quality monitoring station 1aBRB006.33, at Route 625 (Waxpool Road)
-biological monitoring station 1aBRB006.97, upstream from Waxpool Road

The fish consumption use is categorized as impaired due to a Virginia Department of Health, Division of Health Hazards Control, PCB fish consumption advisory. Biological monitoring finds a benthic macroinvertebrate impairment, resulting in an impaired classification for the aquatic life use. E. coli monitoring finds a bacterial impairment, resulting in an impaired classification for the recreation use. The wildlife use is considered fully supporting.

b. 303(d) Listed Stream Segments and Total Maximum Daily Loads (TMDLs)

TABLE 3- 303(d) Impairment and TMDL information for the receiving stream segment

Waterbody Name	Impaired Use	Cause	TMDL completed	WLA	Basis for WLA	TMDL Schedule
Impairment Information in the Draft 2014 Integrated Report						
Broad Run	Aquatic Life	Benthic Macroinvertebrates	---	---	---	2020
	Fish Consumption	PCBs	---	---	---	TBD

TABLE 4- Information on Downstream 303(d) Impairments and TMDLs

Waterbody Name	Impaired Use	Cause	Distance From Outfall (miles)	TMDL completed	WLA	Basis for WLA	TMDL Schedule
Impairment Information in the Draft 2014 Integrated Report							
Broad Run	Aquatic Life	Benthic Macroinvertebrates	Outfall 002: 0.4 Outfall 003: 0.9 Outfall 004: 0.5 Outfall 005: 0.8 Outfall 006: 0.9	---	---	---	Outfall 002: TBD Outfalls 003, 004, 005, 006: 2020
	Recreation	*E. coli*	Outfall 001: 1.6 Outfall 002: 0.4 Outfall 003: 0.9 Outfall 004: 0.5 Outfall 005: 0.8 Outfall 006: 0.9	---	---	---	Outfalls 001 and 002: 2026 Outfalls 003, 004, 005, 006: 2022
	Fish Consumption	Mercury	Outfall 001: 1.6 Outfall 002: 0.4 Outfall 003: 2.7 Outfall 004: 3.1 Outfall 005: 3.8 Outfall 006: 3.9	---	---	---	2022
		PCBs	Outfall 002: 0.4 Outfall 003: 0.9 Outfall 004: 0.5 Outfall 005: 0.8 Outfall 006: 0.9	---	---	---	TBD

Significant portions of the Chesapeake Bay and its tributaries are listed as impaired on Virginia's 303(d) list of impaired waters for not meeting the aquatic life use support goal, and the draft 2012 Virginia Water Quality Assessment 305(b)/303(d) Integrated Report indicates that much of the mainstem Bay does not fully support this use support goal under Virginia's Water Quality Assessment guidelines. Nutrient enrichment is cited as one of the primary causes of impairment. EPA issued the Bay TMDL on December 29, 2010. It was based, in part, on the Watershed Implementation Plans developed by the Bay watershed states and the District of Columbia.

The Chesapeake Bay TMDL addresses all segments of the Bay and its tidal tributaries that are on the impaired waters list. As with all TMDLs, a maximum aggregate watershed pollutant loading necessary to achieve the Chesapeake Bay's water quality standards has been identified. This aggregate watershed loading is divided among the Bay states and their major tributary basins, as well as by major source categories [wastewater, urban storm water, onsite/septic agriculture, air deposition]. Fact Sheet Section 17.e provides additional information on specific nutrient limitations for this facility to implement the provisions of the Chesapeake Bay TMDL.

The planning statement is found in Attachment 8.

c. Receiving Stream Water Quality Criteria

Part IX of 9VAC25-260(360-550) designates classes and special standards applicable to defined Virginia river basins and sections. The receiving stream, Broad Run, is located within Section 8 of the Potomac River Basin, and classified as a Class III water.

At all times, Class III waters must achieve a dissolved oxygen (D.O.) of 4.0 mg/L or greater, a daily average D.O. of 5.0 mg/L or greater, a temperature that does not exceed 32°C, and maintain a pH of 6.0-9.0 standard units (S.U.).

The Freshwater Water Quality/Wasteload Allocation Analyses details other water quality criteria applicable to the receiving stream. There is one for the 11 MGD flow tier (Attachment 9) and one for the 22 MGD (Attachment 10) flow tier. The Freshwater Water Quality/Wasteload Allocation Analysis for Outfalls 002, 003, 004, 005 and 006 can be found in Attachment 11.

Some Water Quality Criteria are dependent on the temperature and pH and Total Hardness of the stream and final effluent. The stream and final effluent values used as part of Attachments 9, 10, and 11 are as follows:

pH and Temperature for Ammonia Criteria:
The fresh water, aquatic life Water Quality Criteria for Ammonia are dependent on the instream temperature and pH. Since the effluent may have an impact on the instream values, the temperature and pH values of the effluent must also be considered when determining the ammonia criteria for the receiving stream. The 90th percentile temperature and pH values are used because they best represent the critical conditions of the receiving stream.

Staff has evaluated the maximum pH effluent data from January 2011 through April 2015 for pH and established a 90^{th} percentile pH value of 7.6 S.U. and a 10^{th} percentile pH value of 7.2 S.U. There is no current effluent temperature data, so the previously established 90^{th} percentile for the annual temperature value of 24.25°C shall be carried forward. A default temperature of 15°C was used for the winter. The pH and temperature data for the effluent can be found in Attachment 12.

Staff has re-evaluated the receiving stream ambient monitoring data from DEQ Ambient Monitoring Station 1ABRB002.15 for pH and temperature from April 2001 through March 2015. Evaluation of the available field data established a 90^{th} percentile pH value of 7.85 S.U. and a 10^{th} percentile pH value of 7.24 S.U. Evaluation of the available field data established a 90^{th} percentile annual temperature value of 25.74°C. A default temperature of 15°C was used for the winter. The ambient data can be found in Attachment 13.

Since there is no effluent data nor is there stream data for the new outfalls, it is staff's best professional judgment that the data from Outfall 001 can be used since it is the final effluent that is pumped to the reclaimed water lines.

Total Hardness for Hardness-Dependent Metals Criteria:
The Water Quality Criteria for some metals are dependent on the receiving stream's total hardness (expressed as mg/L calcium carbonate) as well as the total hardness of the final effluent.

The effluent data for total hardness is also used to determine the hardness-dependent metals criteria. The hardness-dependent metals criteria in Attachments 9, 10, and 11 are based on an effluent value of 132 mg/L for quarterly effluent data collected

from the Fourth Quarter 2010 through the First Quarter 2015. The data is found in Attachment 12.

Staff reviewed ambient data from DEQ Ambient Monitoring Station 1ABRB002.15 collected between December 1998 and June 1990 and determined the Total Hardness for Broad Run to be 102 mg/L as $CaCO_3$. This data can be found in Attachment 13.

Since there is no effluent data nor is there stream data for the new outfalls, it is staff's best professional judgment that the data from Outfall 001 can be used since it is the final effluent that is pumped to the reclaimed water lines and the receiving stream is ultimately the same even though the flows in the unnamed tributaries are zero.

Bacteria Criteria:
The Virginia Water Quality Standards at 9VAC25-260-170A state that the following criteria shall apply to protect primary recreational uses in surface waters:

E. coli bacteria per 100 ml of water shall not exceed a monthly geometric mean of the following:

	Geometric Mean[1]
Freshwater *E. coli* (N/100 ml)	126

[1]For a minimum of four weekly samples [taken during any calendar month].

d. Receiving Stream Special Standards

The State Water Control Board's Water Quality Standards, River Basin Section Tables (9VAC25-260-360, 370 and 380) designates the river basins, sections, classes, and special standards for surface waters of the Commonwealth of Virginia. The receiving streams, Broad Run and the unnamed tributaries to Broad Run, are located within Section 8 of the Potomac Basin. This section has been designated with a special standard of PWS.

Special Standard PWS designates a public water supply intake. The Board's Water Quality Standards establish numerical standards for specific parameters calculated to protect human health from toxic effects through drinking water and fish consumption. See 9VAC25-260-140 B for applicable criteria. The intake for the Fairfax Water Corbalis WTP is approximately 10 miles downstream from outfall 001.

e. Policy for Sewage Treatment in the Dulles Area Watershed

Chapter 9VAC25-401, Sewage Treatment in the Dulles Area Watershed, was established to regulate the discharge from sewage treatment plants in the Dulles Area Watershed, which is located upstream of several major public water supply intakes serving the Washington, D.C. metropolitan area. This regulation prescribes the effluent limitations for the sewage treatment works, the design requirements for the sewage treatment plants and pumping stations, and the requirement for an instream monitoring program. The Broad Run WRF discharges to the affected area, so this Policy is applicable to this permit for Outfall 001.

16. Antidegradation (9VAC25-260-30):

All state surface waters are provided one of three levels of antidegradation protection. For Tier 1 or existing use protection, existing uses of the water body and the water quality to protect these uses must be maintained. Tier 2 water bodies have water quality that is better than the water quality standards. Significant lowering of the water quality of Tier 2 waters is not allowed without an evaluation of the economic and social impacts. Tier 3 water bodies are exceptional waters and are so designated by regulatory amendment. The antidegradation policy prohibits new or expanded discharges into exceptional waters.

The receiving stream has been classified as Tier 1 based on the fact that this is an urban stream in a well developed area of Loudoun County and the stream is listed as impaired for the aquatic life use. Permit limits proposed have been established by determining wasteload allocations which will result in the discharge maintaining all water quality criteria which apply to the receiving stream, including narrative criteria. These wasteload allocations will provide for the protection and maintenance of all existing uses with regard to the impact of the discharge on surface waters.

17. Effluent Screening, Wasteload Allocation, and Effluent Limitation Development:

To determine water quality-based effluent limitations for a discharge, the suitability of data must first be determined. Data is suitable for analysis if one or more representative data points is equal to or above the quantification level ("QL") and the data represent the exact pollutant being evaluated.

Next, the appropriate Water Quality Standards are determined for the pollutants in the effluent. Then, the Wasteload Allocations (WLA) are calculated. The WLA values are then compared with available effluent data to determine the need for effluent limitations. Effluent limitations are needed if the 97th percentile of the daily effluent concentration values is greater than the acute wasteload allocation or if the 97th percentile of the four-day average effluent concentration values is greater than the chronic wasteload allocation. Effluent limitations are then calculated on the most limiting WLA, the required sampling frequency, and statistical characteristics of the effluent data.

a. Effluent Screening:
Effluent data obtained from the permit application and Discharge Monitoring Reports (DMRs) has been reviewed and determined to be suitable for evaluation. During the current permit cycle, the permittee monitored Bis(2-Ethylhexyl)Phthalate, Copper and Zinc due to data submitted as part of the 2010 permit application. A summary of these quarterly results can be found in Attachment 14. In addition to this data, the permittee performed three priority pollutant scans as part of the Form 2A application. The table below summarizes the parameters with detectable concentrations.

TABLE 5 – Form 2A Data for Outfall 001

Sample Date	Dissolved Zinc	Dissolved Copper	Chloroform	Phenol
9/17/2014	72.1 ug/L	Nondetectable	1.4 ug/L	13 ug/L
9/24/2014	78.9 ug/L	7.2 ug/L	1.2 ug/L	Nondetectable
10/1/2014	68.2 ug/L	7.5 ug/L	1.3 ug/L	11 ug/L

A wasteload allocation analysis will be conducted for the following pollutants: Bis(2-Ethylhexyl)Phthalate, Copper, Zinc, Chloroform, Phenol, and Ammonia as N.

b. Mixing Zones and Wasteload Allocations (WLAs):

Wasteload allocations (WLAs) are calculated for those parameters in the effluent with the reasonable potential to cause an exceedance of water quality criteria. The basic calculation for establishing a WLA is the steady state complete mix equation:

$$WLA = \frac{Co\,[\,Qe + (f)(Qs)\,] - [\,(Cs)(f)(Qs)\,]}{Qe}$$

Where:
- WLA = Wasteload allocation
- Co = In-stream water quality criteria
- Qe = Design flow
- f = Decimal fraction of critical flow from mixing evaluation
- Qs = Critical receiving stream flow (1Q10 for acute aquatic life criteria; 7Q10 for chronic aquatic life criteria; 30Q10 for ammonia criteria; harmonic mean for carcinogen-human health criteria; and 30Q5 for non-carcinogen human health criteria)
- Cs = Mean background concentration of parameter in the receiving stream.

The Water Quality Standards contain two distinct mixing zone requirements. The first requirement is general in nature and requires the "use of mixing zone concepts in evaluating permit limits for acute and chronic standards in 9VAC25-260-140.B". The second requirement is specific and establishes special restrictions for regulatory mixing zones "established by the Board".

The Department of Environmental Quality uses a simplified mixing model to estimate the amount of mixing of a discharge with the receiving stream within specified acute and chronic exposure periods. The simplified model contains the following assumptions and approximations:

- The effluent enters the stream from the bank, either via a pipe, channel or ditch.
- The effluent velocity isn't significantly greater (no more than 1 - 2 ft/sec greater) than the stream velocity.
- The receiving stream is much wider than its depth (width at least ten times the depth).
- Diffusive mixing in the longitudinal direction (lengthwise) is insignificant compared with advective transport (flow).
- Complete vertical mixing occurs instantaneously at the discharge point. This is assumed since the stream depth is much smaller than the stream width.
- Lateral mixing (across the width) is a linear function of distance downstream.
- The effluent is neutrally buoyant (e.g. the effluent discharge temperature and salinity are not significantly different

from the stream's ambient temperature and salinity).

- Complete mix is determined as the point downstream where the variation in concentration is 20% or less across the width and depth of the stream.
- The velocity of passing and drifting organisms is assumed equal to the stream velocity.

If it is suitably demonstrated that a reasonable potential for lethality or chronic impacts within the physical mixing area doesn't exist, then the basic complete mix equation, with 100% of the applicable stream flow, is appropriate. If the mixing analysis determines there is a potential for lethality or chronic impacts within the physical mixing area, then the proportion of stream flow that has mixed with the effluent over the allowed exposure time is used in the basic complete mix equation. As such, the wasteload allocation equation is modified to account for the decimal fraction of critical flow (f).

Staff derived wasteload allocations where parameters are reasonably expected to be present in an effluent (e.g., total residual chlorine where chlorine is used as a means of disinfection) and where effluent data indicate the pollutant is present in the discharge above quantifiable levels. With regard to the Outfall 001 discharge, ammonia as N is likely present since this is a WWTP treating sewage, and Copper, Zinc, and Bis(2-Ethylhexyl)Phthalate were monitored quarterly because they were detected in results submitted with the 2010 permit application, and Attachment A data indicate Zinc, Chloroform, and Phenol are present in the discharge. As such, Attachments 9 and 10 details the mixing analysis results and WLA derivations for these pollutants for Outfall 001.

c. Effluent Limitations Toxic Pollutants, Outfall 001 –

9VAC25-31-220.D. requires limits be imposed where a discharge has a reasonable potential to cause or contribute to an in-stream excursion of water quality criteria. Those parameters with WLAs that are near effluent concentrations are evaluated for limits.

The VPDES Permit Regulation at 9VAC25-31-230.D requires that monthly and weekly average limitations be imposed for continuous discharges from POTWs and monthly average and daily maximum limitations be imposed for all other continuous non-POTW discharges.

1) Ammonia as N/TKN for Outfall 001:

The regulation for Sewage Treatment in the Dulles Area Watershed requires that the permit have a TKN monthly average limit of 1.0 mg/L. The Total Kjeldahl Nitrogen (TKN) analysis measures both organic nitrogen and ammonia nitrogen. A TKN limit of 1.0 mg/L assumes that the remaining nitrogen is in the form of refractory organic compounds that will not be easily oxidized and that ammonia is removed when the 1.0 mg/L TKN limit is met. It is staff's Best Professional Judgment that an ammonia limit is not necessary, and that the TKN monthly average limit of 1.0 mg/L is protective of the water quality standards.

2) Metals/Organics for Outfall 001:

Bis(2-Ethylhexyl)Phthalate.

The facility has monitored for Bis(2-Ethylhexyl)Phthalate on a quarterly basis during the current permit term. There have been no quantifiable results since the one data point provided as part of the 2010 permit reissuance application. Since all results are less than detection, there is no reasonable potential to cause and/or contribute to an exceedance of the Water Quality Standard so no further monitoring is necessary in the next permit cycle.

Copper.

The facility has monitored for Dissolved Copper on a quarterly basis during the current permit term. Staff calculated WLAs for Copper using the available flow data and mixing allowances which are found in Attachments 9 and 10. In accordance with current DEQ guidance, staff used the available data and the calculated WLAs to derive limits. Based on an evaluation of the available data (Attachment 15), there is no reasonable potential to cause and/or contribute to an exceedance of the Water Quality Standard; therefore, no further monitoring or limitations are proposed for the draft permit.

Zinc.

The facility has monitored for Dissolved Zinc on a quarterly basis during the current permit term. Staff calculated WLAs for Zinc using the available flow data and mixing allowances which are found in Attachments 9 and 10. In accordance with current DEQ guidance, staff used the available data and the calculated WLAs to derive limits. Based on an evaluation of the available data, there is reasonable potential and therefore, limits shall be included in the draft for Zinc. The calculation of the monthly average concentration (150 ug/L) and the weekly average limit (150 ug/L) are presented in Attachment 15.

Since this is a new limit, the facility shall be given a 4 year compliance schedule to meet the new effluent limitation. During the schedule of compliance, the facility shall monitor without limitation for Dissolved Zinc and Total Hardness on a monthly basis. Once the limit is effective, the facility shall monitor Total Recoverable Zinc monthly and will no longer be required to monitor for Dissolved Zinc or Total Hardness. See Fact Sheet Section 20.e for the Schedule of Compliance for Zinc.

Chloroform.

In all three Form 2A samples, Chloroform was detected. There are only Human Health standards for Chloroform and the WLA at the 11 MGD flow tier is 390 ug/L for this discharge since the receiving stream is designated a Public Water Supply. The concentrations were all just slightly above 1 ug/L so it is staff's best professional judgment that there is no reasonable potential to exceed the WLA or the water quality criteria. No additional monitoring is proposed for the next permit.

Phenol.

In two of the three Form 2A samples, Phenol was detected. There are only Human Health standards for Phenol and the WLA at the 11 MGD flow tier is 1,100 ug/L for this discharge since the receiving stream is designated a Public Water Supply. The concentrations were all 13 ug/L and 11 ug/L so it is staff's best professional judgment that there is no reasonable potential to exceed the WLA or the water quality criteria. No additional monitoring is proposed for the next permit.

3) Total Residual Chlorine for Outfalls 002, 003, 004, 005, and 006:

Since Chlorine is added to the reclaimed water prior to distribution, it is staff's best professional judgment that Total Residual Chlorine (TRC) limitations are necessary. Staff calculated WLAs for TRC which are found in Attachment 11. In accordance with current DEQ guidance, staff used a default data point of 0.2 mg/L and the calculated WLAs to derive limits. The calculation of the monthly average concentration (0.016 mg/L) and the weekly average limit (0.016 mg/L) are presented in Attachment 15.

d. Effluent Limitations and Monitoring, Outfall 001 – Conventional and Non-Conventional Pollutants

The regulation for Sewage Treatment in the Dulles Area Watershed includes minimum effluent quality requirements. The limits presented below that are proposed in this permit for the current flow tier of 11 MGD and the future expansion of 22 MGD are prescribed in 9VAC25-401-30.B.

Parameter	Monthly Average
Chemical Oxygen Demand	10.0 mg/L
Total Suspended Solids	1.0 mg/L
Total Phosphorus	0.10 mg/L
Turbidity	0.5 NTU
Total Kjeldahl Nitrogen	1.0 mg/L
E. coli	<2 n/cmL

The weekly average limitations for Chemical Oxygen Demand, Total Suspended Solids, Total Phosphorus, and Total Kjeldahl Nitrogen were derived using a 1.5 multiplier.

The Dissolved Oxygen minimum limitation of 6.0 mg/L is set to meet the water quality criteria for dissolved oxygen in the receiving stream.

The limits for pH are based on the water quality criteria.

e. Effluent Limitations and Monitoring, Outfalls 002, 003, 004, 005, and 006 – Conventional Pollutants

These new outfalls were established with this reissuance to help maintain the water quality in the reclaimed water lines for reclamation and reuse. Loudoun Water modeled the reclaimed water system and determined that these five points would be appropriate to maintain the quality of the reclaimed water for the entire system.

Since there is the potential for Total Suspended Solids (TSS) to be in the flush water, it is staff's best professional judgment that TSS limitations be placed on these outfalls. Limitations are based on staff's best professional judgment.

The limits for pH are based on the water quality criteria.

f. Effluent Nutrients Annual Average Limitations and Monitoring, Outfall 001

VPDES Regulation 9VAC25-31-220(D) requires effluent limitations that are protective of both the numerical and narrative water quality standards for state waters, including the Chesapeake Bay.

As discussed in Section 15, significant portions of the Chesapeake Bay and its tributaries are listed as impaired with nutrient enrichment cited as one of the primary causes. Virginia has committed to protecting and restoring the Bay and its tributaries. Only concentration limits are now found in the individual VPDES permit when the facility installs nutrient removal technology. The basis for the concentration limits is 9VAC25-40 - *Regulation for Nutrient Enriched Waters and Dischargers within the Chesapeake Bay Watershed* which requires new or expanding discharges with design flows of ≥0.04 MGD to treat for TN and TP to either BNR (Biological Nutrient Removal) levels (TN = 8.0 mg/L; TP = 1.0 mg/L) or SOA (State of the Art) levels (TN = 3.0 mg/L and TP = 0.3 mg/L).

This facility has also obtained coverage under 9VAC25-820 *General Virginia Pollutant Discharge Elimination System (VPDES) Watershed Permit Regulation for Total Nitrogen and Total Phosphorus Discharges and Nutrient Trading in the Chesapeake Bay Watershed in Virginia.* This regulation specifies and controls the nitrogen and phosphorus loadings from facilities and specifies facilities that must register under the general permit. Nutrient loadings for those facilities registered under the general permit as well as compliance schedules and other permit requirements, shall be authorized, monitored, limited, and otherwise regulated under the general permit and not this individual permit. This facility has coverage under this General Permit; the permit number is VAN010017. Total Nitrogen Annual Loads and Total Phosphorus Annual Loads from this facility are found in 9VAC25-720 – *Water Quality Management Plan Regulation* which sets forth TN and TP maximum wasteload allocations for facilities designated as significant discharges, i.e., those with design flows of ≥0.5 MGD above the fall line and >0.1 MGD below the fall line.

Monitoring and appropriate limitations Total Kjeldahl Nitrogen, Total Nitrogen, and Total Phosphorus are included in this permit. The monitoring is needed to protect the Water Quality Standards of the Chesapeake Bay. Monitoring frequencies are set at the frequencies set forth in 9VAC25-820. Annual average effluent limitations, as well as monthly and year to date calculations, for Total Nitrogen are included in this individual permit. The annual averages are based on the technology installed as part of the WQIF grant funding.

Monitoring for Nitrates + Nitrites is included in this permit. The monitoring is needed to protect the Water Quality Standards of the Chesapeake Bay. Monitoring frequencies are set at the frequencies set forth in 9VAC25-820.

Annual average effluent limitations, as well as monthly and year to date calculations, for Total Nitrogen are included in this individual permit. No annual average concentration limit for Total Phosphorus is necessary. The Dulles Policy requires a monthly average concentration of 0.10 mg/L. This monthly limitation is more stringent than the annual average limit required by 9VAC25-40-70A.

The TN annual average concentration limits for the 11.0 MGD design flow is 4.0 mg/L. The limit is included per 9VAC25-40.70.A.4., and is based on the values used to derive the WLA per 9VAC25-720.50.C.

The TN annual average concentration limit for the 22.0 MGD design flow is 3.0 mg/L. The limit is included per 9VAC25-70.A.3.

g. Effluent Limitations and Monitoring Summary:

The effluent limitations are presented in the following tables (19.A and 19.B) for Outfall 001. Limits were established for Chemical Oxygen Demand (COD), Total Suspended Solids, Total Kjeldahl Nitrogen, Total Nitrogen, and Total Phosphorus, pH, Dissolved Oxygen, Turbidity, and *E. coli*. Monitoring is included for Flow, Nitrate+Nitrite, and Whole Effluent Toxicity.

The effluent limitations are presented in the following table (19.C) for Outfalls 002, 003, 004, 005, and 006. Limits were established for Total Residual Chlorine, pH, and Total Suspended Solids. Monitoring is included for Flow.

The mass loading (kg/d) for monthly and weekly averages were calculated by multiplying the concentration values (mg/L), with the flow values (in MGD) and a conversion factor of 3.785.

The mass loading (lb/d) for TKN/Total Phosphorus monthly and weekly averages were calculated by multiplying the concentration values (mg/L), with the flow values (in MGD) and a conversion factor of 8.345.

Sample Type and Frequency are in accordance with the recommendations in the VPDES Permit Manual.

The VPDES Permit Regulation at 9VAC25-31-30 and 40 CFR Part 133 require that the facility achieve at least 85% removal for BOD and TSS (or 65% for equivalent to secondary). The Chemical Oxygen Demand limits in this permit are water-quality-based effluent limits and result in greater than 85% removal.

18. Antibacksliding:

All limits in this permit are at least as stringent as those previously established. Backsliding does not apply to this reissuance.

19. Effluent Limitations/Monitoring Requirements:

A. Outfall 001 – 11 MGD Facility

Design flow of this facility is 11.0 MGD.

Effective Dates: During the period beginning with the reissuance of the permit and lasting until the issuance of the CTO for the 22.0-MGD facility or until the expiration date of the permit, whichever comes first.

PARAMETER	BASIS FOR LIMITS	DISCHARGE LIMITATIONS				MONITORING REQUIREMENTS	
		Monthly Average	Weekly Average	Minimum	Maximum	Frequency	Sample Type
Flow (MGD)	NA	NL	NA	NA	NL	Continuous	TIRE
COD (mg/L)	5	10 mg/L 420 kg/day	15 mg/L 620 kg/day	NA	NA	1/D	24H-C
TSS (mg/L)	5	1.0 mg/L 42 kg/day	1.5 mg/L 62 kg/day	NA	NA	1/D	24H-C
TKN (mg/L)	5	1.0 mg/L 92 lb/day	1.5 mg/L 140 lb/day	NA	NA	1/D	24H-C
Nitrate+Nitrite, as N	3	NL mg/L	NA	NA	NA	1/W	24H-C
Total Nitrogen**	3	NL mg/L	NA	NA	NA	1/W	Calculated
Total Nitrogen Year to Date*	3	NL mg/L	NA	NA	NA	1/M	Calculated
Total Nitrogen Calendar Year*	3, 6	4.0 mg/L	N/A	N/A	NA	1/YR	Calculated
Total Phosphorus	5	0.10 mg/L 9.2 lb/day	0.15 mg/L 14 lb/day	NA	NA	1/D	24H-C
Turbidity	5	0.5 NTU	NA	NA	NA	3/D 8H	Grab
pH (S.U.)	3	NA	NA	6.0	9.0	1/D	Grab
Dissolved Oxygen (mg/L)	2, 3	NA	NA	6.0 mg/L	NA	1/D	Grab
E. coli (Geometric Mean)	5	<2 n/100mL	NA	NA	NA	1/D	Grab
Chronic Toxicity – *C. dubia* (TU_c)	NA	NA	NA	NA	NL	1/YR	24H-C
Chronic Toxicity – *P. promelas* (TU_c)	NA	NA	NA	NA	NL	1/YR	24H-C
Total Recoverable Zinc$	3	150 ug/L	150 ug/L	NA	NA	1/M	Grab
Dissolved Zinc$	3	NL mg/L	NL mg/L	NA	NA	1/M	Grab
Total Hardness (as Calcium Carbonate)$	3	NL mg/L	NL mg/L	NA	NA	1/M	Grab

The basis for the limitations codes are:

1. Federal Effluent Requirements
2. Best Professional Judgment
3. Water Quality Standards
4. VDH-DEQ Disinfection Policy
5. 9VAC25-401-30B
6. 9VAC25-70.A

MGD = Million gallons per day.
NA = Not applicable.
NL = No limit; monitor and report.
S.U. = Standard units.
TIRE = Totalizing, indicating and recording equipment.

1/D = Once every day.
1/W = Once per week.
1/M = Once per month.
1/YR = Once every year.
3/D 8H = Three per day at 8-hour intervals.

24H-C = A flow proportional composite sample collected manually or automatically, and discretely or continuously, for the entire discharge of the monitored 24-hour period. Where discrete sampling is employed, the permittee shall collect a minimum of twenty-four (24) aliquots for compositing. Discrete sampling may be flow proportioned either by varying the time interval between each aliquot or the volume of each aliquot. Time composite samples consisting of a minimum of twenty-four (24) grab samples obtained at hourly or smaller intervals may be collected. Where the permittee demonstrates that the discharge flow rate (gallons per minute) does not vary by 10% or more during the monitored discharge.

Grab = An individual sample collected over a period of time not to exceed 15-minutes.

$ See Fact Sheet Section 21.e for the Schedule of Compliance for Zinc. During the first four years of the permit, the permittee shall monitor without limitation Dissolved Zinc and Total Hardness. The Total Recoverable Zinc limit will be effective four years from the effective date of the permit.

* See Section 20.a. for more information on the Nutrient Calculations.

** Total Nitrogen = Sum of TKN plus Nitrate + Nitrite

B. Outfall 001 – 22 MGD Facility

Design flow of this facility is 22.0 MGD.
Effective Dates: During the period beginning with the issuance of the CTO for the 22.0-MGD facility until the expiration date of the permit.

PARAMETER	BASIS FOR LIMITS	DISCHARGE LIMITATIONS				MONITORING REQUIREMENTS	
		Monthly Average	Weekly Average	Minimum	Maximum	Frequency	Sample Type
Flow (MGD)	NA	NL	NA	NA	NL	Continuous	TIRE
COD (mg/L)	5	10 mg/L 830 kg/day	15 mg/L 1250 kg/day	NA	NA	1/D	24H-C
TSS (mg/L)	5	1.0 mg/L 83 kg/day	1.5 mg/L 125 kg/day	NA	NA	1/D	24H-C
TKN (mg/L)	5	1.0 mg/L 180 lb/day	1.5 mg/L 280 lb/day	NA	NA	1/D	24H-C
Nitrate+Nitrite, as N	3	NL mg/L	NA	NA	NA	3 D/W	24H-C
Total Nitrogen**	3	NL mg/L	NA	NA	NA	3 D/W	Calculated
Total Nitrogen Year to Date*	3	NL mg/L	NA	NA	NA	1/M	Calculated
Total Nitrogen Calendar Year*	3, 6	3.0 mg/L	NA	NA	NA	1/YR	Calculated
Total Phosphorus	5	0.10 mg/L 18 lb/day	0.15 mg/L 28 lb/day	NA	NA	1/D	24H-C
Turbidity	5	0.5 NTU	NA	NA	NA	3/D 8H	Grab
pH (S.U.)	3	NA	NA	6.0	9.0	1/D	Grab
Dissolved Oxygen (mg/L)	2, 3	NA	NA	6.0 mg/L	NA	1/D	Grab
E. coli (Geometric Mean)	5	<2 n/100mL	NA	NA	NA	1/D	Grab
Chronic Toxicity – *C. dubia* (TU_c)	NA	NA	NA	NA	NL	1/3M	24H-C
Chronic Toxicity – *P. promelas* (TU_c)	NA	NA	NA	NA	NL	1/3M	24H-C
Total Recoverable Zinc	3	150 ug/L	150 ug/L	NA	NA	1/M	Grab

The basis for the limitations codes are:
1. Federal Effluent Requirements
2. Best Professional Judgment
3. Water Quality Standards
4. VDH-DEQ Disinfection Policy
5. 9VAC25-401-30B
6. 9VAC25-70.A

MGD = Million gallons per day.
NA = Not applicable.
NL = No limit; monitor and report.
S.U. = Standard units.
TIRE = Totalizing, indicating and recording equipment.

1/D = Once every day.
3 D/W = Three days per week.
1/M = Once per month.
1/3M = Once every three months.
3/D 8H = Three per day at 8-hour intervals.
1/YR = Once every year.

24H-C = A flow proportional composite sample collected manually or automatically, and discretely or continuously, for the entire discharge of the monitored 24-hour period. Where discrete sampling is employed, the permittee shall collect a minimum of twenty-four (24) aliquots for compositing. Discrete sampling may be flow proportioned either by varying the time interval between each aliquot or the volume of each aliquot. Time composite samples consisting of a minimum of twenty-four (24) grab samples obtained at hourly or smaller intervals may be collected. Where the permittee demonstrates that the discharge flow rate (gallons per minute) does not vary by 10% or more during the monitored discharge.

Grab = An individual sample collected over a period of time not to exceed 15-minutes.

$ If the facility applies for the Certificate to Operate (CTO) for the 22 MGD flow tier during the first four years of the permit term the effluent imitatior for Total Recoverable Zinc shall become effective upon issuance of the CTO.

* See Section 20.a. for more information on the Nutrient Calculations.

** Total Nitrogen = Sum of TKN plus Nitrate + Nitrite

C. Outfalls 002, 003, 004, 005, and 006 – Flush Water from the Reclaimed Water Distribution System

Effective Dates: During the period beginning with the reissuance of the permit and lasting until the expiration date of the permit.

PARAMETER	BASIS FOR LIMITS	DISCHARGE LIMITATIONS				MONITORING REQUIREMENTS	
		Monthly Average	Weekly Average	Minimum	Maximum	Frequency	Sample Type
Flow (MGD)	NA	NL	NA	NA	NL	1/6M	Estimate
TSS	2	30 mg/L	45 mg/L	NA	NA	1/6M	Grab
Total Residual Chlorine	3	0.016 mg/L	0.016 mg/L	NA	NA	1/6M	Grab
pH (S.U.)	3	NA	NA	6.0	9.0	1/6M	Grab

The basis for the limitations codes are:
1. Federal Effluent Requirements
2. Best Professional Judgment
3. Water Quality Standards

MGD = Million gallons per day.
NA = Not applicable.
NL = No limit; monitor and report.
S.U. = Standard units.
1/6M = Once every 6 months.

Grab = An individual sample collected over a period of time not to exceed 15-minutes.
Estimate = Reported flow is to be based on the technical evaluation of the sources contributing to the discharge.

The semiannual monitoring periods shall be January through June and July through December. The DMR shall be submitted no later than the 10th day of the month following the monitoring period.

D. Stormwater Outfalls

Effective Dates: During the period beginning with the reissuance of the permit and lasting until the expiration date of the permit.

The facility is authorized to discharge stormwater through each of these outfalls. No monitoring is required from these stormwater outfalls. Best Management Practices shall be utilized.

20. Other Permit Requirements:

a. Part I.B. of the permit contains quantification levels and compliance reporting instructions.

9VAC25-31-190.L.4.c. requires an arithmetic mean for measurement averaging and 9VAC25-31-220.D requires limits be imposed where a discharge has a reasonable potential to cause or contribute to an in-stream excursion of water quality criteria. Specific analytical methodologies for toxics are listed in this permit section as well as quantification levels (QLs) necessary to demonstrate compliance with applicable permit limitations or for use in future evaluations to determine if the pollutant has reasonable potential to cause or contribute to a violation. Required averaging methodologies are also specified.

The calculations for the Nitrogen and Phosphorus parameters shall be in accordance with the calculations set forth in 9VAC25-820 *General Virginia Pollutant Discharge Elimination System (VPDES) Watershed Permit Regulation for Total Nitrogen and Total Phosphorus Discharges and Nutrient Trading in the Chesapeake Bay Watershed in Virginia.* §62.1-44.19:13 of the Code of Virginia defines how annual nutrient loads are to be calculated; this is carried forward in 9VAC25-820-70. As annual concentrations (as opposed to loads) are limited in the individual permit, these reporting calculations are intended to reconcile the reporting calculations between the permit programs, as the permittee is collecting a single set of samples for the purpose of ascertaining compliance with two permits.

b. Permit Section Part I.C., details the requirements for Whole Effluent Toxicity (WET) Program.

The VPDES Permit Regulation at 9VAC25-31-210 requires monitoring and 9VAC25-31-220.I, requires limitations in the permit to provide for and assure compliance with all applicable requirements of the State Water Control Law and the Clean Water Act. A WET Program is imposed for municipal facilities with a design rate >1.0 MGD, with an approved pretreatment program or required to develop a pretreatment program, or those determined by the Board based on effluent variability, compliance history, IWC, and receiving stream characteristics.

This is a major, municipal facility with design flows of 11.0 and 22.0 MGD; therefore, the facility shall continue to monitor chronic toxicity using two test species, *Ceriodaphnia dubia* and *P. promelas*. The facility completed quarterly monitoring for two years after the issuance of the Certificate To Operate (CTO) for the 11 MGD flow tier and was granted a reduction to annual monitoring since all tests passed the screening criteria. The facility shall continue to monitor for toxicity on an annual

basis until the CTO for the 22 MGD facility is issued. Once the CTO for the 22 MGD is issued, the facility shall again collect quarterly samples for two years.

As stated above, reasonable potential determinations must take into account effluent quality and receiving stream variability. This would necessitate a sampling regime that rotates throughout a given calendar year; a quarterly schedule in order to obtain a seasonal perspective of the effluent quality. This methodology coincides with the VPDES Permit Regulation requirements that facilities submit representative data that reflects the seasonal variation in the discharge with each permit application (9VAC25-31-100.K.4.g.). Therefore, it is staff's best professional judgment that a WET testing protocol be proposed with this permit action that requires a rotating, quarterly testing regime for each annual monitoring requirement. The schedule as set forth within Part I.C. of the permit will ensure that the discharge is monitored for whole effluent toxicity and demonstrates seasonal variations.

See Attachment 16 for the summary of the past test results and the derivation of the endpoints for both flow tiers.

c. Permit Section Part I.D., details the requirements of a Pretreatment Program.

The VPDES Permit Regulation at 9VAC25-31-730 through 900, and 40 CFR Part 403 requires POTWs with a design flow of >5 MGD and receiving from Industrial Users (IUs) pollutants that pass through or interfere with the operation of the POTW, or are otherwise subject to pretreatment standards, to develop a pretreatment program.

The Broad Run WRF is a POTW with a current design capacity of 11 MGD. Since this facility discharges greater than 40,000 gpd, the requirement to perform an Industrial Users Survey as well as the pretreatment program conditions in accordance with DEQ guidance are included in Part I.D of the VPDES permit. The results of the Survey shall be submitted to DEQ-NRO. With this reissuance, the facility shall implement a pretreatment program. Program requirements are included in the draft permit.

d. Permit Section Part I.E., Schedule of Compliance for Total Recoverable Zinc for Outfall 001.

The VPDES Permit Regulation, 9VAC25-31-250 allows use of Compliance Schedules to allow facilities sufficient time for upgrades to meet newly established effluent limits. The permit contains newly established limits for Total Recoverable Copper. Since the facility was not designed to meet these limits, a schedule of compliance is required to provide the permittee time for facility upgrade. The permittee shall achieve compliance with the final limits specified in Part I.A. of the VPDES permit in accordance with the following schedule as contained in Part I.E. of the permit:

Action	Time Frame
1. Select engineering firm for design of facilities or submit proposed plan to achieve compliance with final limits.	Within 180 days after the effective date of the permit.
2. Report of progress on attainment of final limits.	The first annual report is twelve months after the effective date.
3. Achieve compliance with final limits.	Within 3 years from the effective date of the permit.

21. Other Special Conditions:

a. **95% Capacity Reopener.** The VPDES Permit Regulation at 9VAC25-31-200.B.4 requires all POTWs and PVOTWs develop and submit a plan of action to DEQ when the monthly average influent flow to their sewage treatment plant reaches 95% or more of the design capacity authorized in the permit for each month of any three consecutive month period. This facility is a POTW.

b. **Indirect Dischargers.** Required by VPDES Permit Regulation, 9VAC25-31-200 B.1 and B.2 for POTWs and PVOTWs that receive waste from someone other than the owner of the treatment works.

c. **O&M Manual Requirement.** Required by Code of Virginia §62.1-44.19; Sewage Collection and Treatment Regulations, 9VAC25-790; VPDES Permit Regulation, 9VAC25-31-190.E. The permittee shall maintain a current Operations and Maintenance (O&M) Manual. The permittee shall operate the treatment works in accordance with the O&M Manual and shall make the O&M Manual available to Department personnel for review upon request. Any changes in the practices and procedures followed by the permittee shall be documented in the O&M Manual within 90 days of the effective date of the changes. Non-compliance with the O&M Manual shall be deemed a violation of the permit.

d. **CTC, CTO Requirement.** The Code of Virginia § 62.1-44.19; Sewage Collection and Treatment Regulations, 9VAC25-790 requires that all treatment works treating wastewater obtain a Certificate to Construct prior to commencing construction and

to obtain a Certificate to Operate prior to commencing operation of the treatment works.

e. **Licensed Operator Requirement.** The Code of Virginia at §54.1-2300 et seq. and the VPDES Permit Regulation at 9VAC25-31-200 C, and by the Board for Waterworks and Wastewater Works Operators and Onsite Sewage System Professionals Regulations (18VAC160-20-10 et seq.) requires licensure of operators. This facility requires a Class I operator.

f. **Reliability Class.** The Sewage Collection and Treatment Regulations at 9VAC25-790 require sewage treatment works to achieve a certain level of reliability in order to protect water quality and public health consequences in the event of component or system failure. Reliability means a measure of the ability of the treatment works to perform its designated function without failure or interruption of service. The facility is required to meet a reliability Class of I.

g. **Water Quality Criteria Reopener.** The VPDES Permit Regulation at 9VAC25-31-220 D. requires establishment of effluent limitations to ensure attainment/maintenance of receiving stream water quality criteria. Should effluent monitoring indicate the need for any water quality-based limitations, this permit may be modified or alternatively revoked and reissued to incorporate appropriate limitations.

h. **In-stream Monitoring.** The regulation for Sewage Treatment in the Dulles Area Watershed at 9VAC25-401-50 requires that the sewage treatment plants identified in 9VAC25-400-30 participate in an instream monitoring program that shall assess the impact of the sewage treatment plant discharge to the downstream watershed. This special condition shall require the permittee to review the current instream monitoring program, in consultation with DEQ-NRO and Fairfax Water, within one year of the permit's effective date. The facility shall continue to monitor in accordance with the approved monitoring plan. If there are any changes or updates to the instream monitoring plan, the updated plan shall be submitted within 18 months of the reissuance date. If no changes are proposed, then a statement of completeness shall be submitted to DEQ-NRO within 18 months of the reissuance date.

i. **Nutrient Offsets**. The Virginia General Assembly, in their 2005 session, enacted a new Article 4.02 (Chesapeake Bay Watershed Nutrient Credit Exchange Program) to the Code of Virginia to address nutrient loads to the Bay. Section 62.1-44.19:15 sets forth the requirements for new and expanded dischargers, which are captured by the requirements of the law, including the requirement that non-point load reductions acquired for the purpose of offsetting nutrient discharges be enforced through the individual VPDES permit.

j. **E3/E4.** 9VAC25-40-70 B authorizes DEQ to approve an alternate compliance method to the technology-based effluent concentration limitations as required by subsection A of this section. Such alternate compliance method shall be incorporated into the permit of an Exemplary Environmental Enterprise (E3) facility or an Extraordinary Environmental Enterprise (E4) facility to allow the suspension of applicable technology-based effluent concentration limitations during the period the E3 or E4 facility has a fully implemented environmental management system that includes operation of installed nutrient removal technologies at the treatment efficiency levels for which they were designed.

k. **Nutrient Reopener.** 9VAC25-40-70 A authorizes DEQ to include technology-based annual concentration limits in the permits of facilities that have installed nutrient control equipment, whether by new construction, expansion or upgrade. 9VAC25-31-390 A authorizes DEQ to modify VPDES permits to promulgate amended water quality standards.

l. **TMDL Reopener.** This special condition is to allow the permit to reopened if necessary to bring it in compliance with any applicable TMDL that may be developed and approved for the receiving stream.

m. **PCB Pollutant Minimization Plan.** This special condition requires the permittee, upon notification from DEQ-NRO, to submit a Pollutant Minimization Plan (PMP) to identify known and unknown sources of low-level PCBs in the effluent. This special condition details the contents of the PMP and also requires an annual report on progress to identify sources.

n. **Unauthorized, Unusual, or Extraordinary Discharge Notification**. Due to the close proximity of major, regional drinking water supply intakes downstream of this discharge, the permittee shall notify Fairfax Water, the Maryland Department of the Environment, and the Interstate Commission of the Potomac River Basin (ICPRB) within six (6) hours of an unauthorized, unusual, or extraordinary discharge.

o. **Nitrate Concentrations in the Potomac River.** This special condition requires the permittee to know what the nitrate concentration is in the Potomac River in the vicinity of the Fairfax Water's intake on the Potomac River (9VAC25-401-

30.B). Should the nitrate concentrations at the intake reach 5 mg/L, the permittee shall evaluate measures they can take to minimize impacts their discharge has on the nitrate concentrations and implement those measures deemed feasible and effective.

22. Permit Section Part II.

Required by VPDES Regulation 9VAC25-31-190, Part II of the permit contains standard conditions that appear in all VPDES Permits. In general, these standard conditions address the responsibilities of the permittee, reporting requirements, testing procedures and records retention.

23. Permit Section Part III.

Part III of the permit contains conditions and requirements for monitoring and distribution of biosolids. The VPDES Permit Regulation 9VAC25-31-420 through 729 establishes the standards for the use or disposal of biosolids; specifically land application and surface disposal, promulgated under 40 CFR Part 503. Standards consist of general requirements, pollutant limits, management practices and operational standards. Furthermore, VPA Regulation 9VAC25-32-303 through 685 sets forth the requirements pertaining to Class B biosolids. The permit sets forth the parameters to be monitored, monitoring frequencies, sampling types, the Biosolids Reopener Special Condition, the Biosolids Use and Disposal Special Condition, and the Biosolids Management Plan and reporting requirements.

24. Permit Section Part IV.

Part IV of the permit contains the Reclaimed Water Standards and Monitoring as well as the special conditions applicable to the reclamation and reuse of the Broad Run effluent. During the 2010 reissuance, the facility was authorized to reuse up to 11 MGD of the final effluent. No changes are proposed to the program at this time.

The Fact Sheet rationale for reclamation and reuse is contained in Attachment 17.

25. Changes to the Permit from the Previously Issued Permit:

a. Special Conditions:
   1) A schedule of compliance was included for Total Recoverable Zinc.
   2) The special condition for low-level PCB monitoring has been removed since the facility has completed the monitoring.
   3) A special condition for a PCB Pollutant Minimization Plan was included.
   4) The monitoring requirements and special conditions for Biosolids were moved to Part III of the permit.

b. Monitoring and Effluent Limitations:
   1) The drainage area for Outfall 001 was updated with better GIS information. The river mile was also updated from 4.37 to 4.50.
   2) Dissolved Copper and Bis(2-Ethylhexyl)Phthalate monitoring for Outfall 001 were removed since the evaluations showed that no limitations were necessary.
   3) Total Recoverable Zinc limitations were included for Outfall 001. During the compliance period, the facility shall monitor for Dissolved Zinc and Total Hardness on a monthly basis.
   4) Outfalls 002, 003, 004, 005 and 006 were included with this reissuance to address the flushing water from the reclaimed water distribution system.

26. Variances/Alternate Limits or Conditions:

There are no variances or alternate limits or special conditions.

27. Public Notice Information:

First Public Notice Date: Second Public Notice Date:

Public Notice Information is required by 9VAC25-31-280 B. All pertinent information is on file and may be inspected, and copied by contacting the: DEQ Northern Regional Office, 13901 Crown Court, Woodbridge, VA 22193, Telephone No. (703) 583-3834, Alison.Thompson@deq.virginia.gov. See Attachment 18 for a copy of the public notice document.

Persons may comment in writing or by email to the DEQ on the proposed permit action, and may request a public hearing, during the comment period. Comments shall include the name, address, and telephone number of the writer and of all persons

represented by the commenter/requester, and shall contain a complete, concise statement of the factual basis for comments. Only those comments received within this period will be considered. The DEQ may decide to hold a public hearing, including another comment period, if public response is significant and there are substantial, disputed issues relevant to the permit. Requests for public hearings shall state 1) the reason why a hearing is requested; 2) a brief, informal statement regarding the nature and extent of the interest of the requester or of those represented by the requester, including how and to what extent such interest would be directly and adversely affected by the permit; and 3) specific references, where possible, to terms and conditions of the permit with suggested revisions. Following the comment period, the Board will make a determination regarding the proposed permit action. This determination will become effective, unless the DEQ grants a public hearing. Due notice of any public hearing will be given. The public may request an electronic copy of the draft permit and fact sheet or review the draft permit and application at the DEQ Northern Regional Office by appointment.

28. Additional Comments:

Previous Board Action(s): None.

Staff Comments: During discussions with Loudoun Water staff in the summer of 2015, it was decided that Outfalls 002, 003, 004, 005 and 006 would be added to the permit in order to permit the flushing of the reclaimed water distribution system to maintain the quality of the water distributed to customers. The application for these outfalls was received in November 2015.

Public Comment: